Read from the textbook: Chapter 1, Sections 1–10.

You can collaborate on the problems as long as you write up all solutions in your own words and understand those solutions.

1) (4 pts) From Ch.1.5 in Apostol: Problem 28.
2) (8 pts) From Ch. 1.10 in Apostol: Problem 22.
3) (5 pts) Let $\mathcal{U}$ be a non empty collection of subspaces of a vector space $V$. Prove
   
   $W = \bigcap_{U \in \mathcal{U}} U$ is a subspace of $V$.

4) (8pts) Let $\mathcal{F}$ be a system of $m$-linear equations in $n$-variables $x_1, \ldots, x_n$
   
   $\sum_{j=1}^{n} a_{i,j}x_j = b_i \quad 1 \leq i \leq m$

   with $a_{i,j}, b_i \in \mathbb{R}$ or $\mathbb{C}$. A solution to $\mathcal{F}$ is a vector $v = (v_1, \ldots, v_n) \in V_n$ such that $\sum_{j=1}^{n} a_{i,j}v_j = b_i$ for all $i$. Determine for which $(b_1, \ldots, b_m) \in V_m$ the set $S(\mathcal{F})$ of solutions of $\mathcal{F}$ is a subspaces of $V_n$. Show that your answer is correct.